REMARKS

Claim Rejections 35 U.S.C. § 103 (a)

Claims 1, 4-12, 18, and 20-33

The Examiner has rejected claims 1, 4-12, 18, and 20-33 under 35 U.S.C. §103 (a) as being unpatentable over Casey, Jr. et al. (US 6,042,738) as demonstrated by Baum et al. (US 5,684,360) in view of Hashimoto (US 6,420,701).

Claim 1, 4-12, 18, and 20-24

Applicants respectfully disagree with the Examiner. Applicants have amended claim 1. Support is provided at lines 25-27 on page 9 of the specification.

Claim 1, as amended, of Applicants' claimed invention, claims an apparatus (400) including: a holder (420) to mount a substrate (410); a stage (430) to position the holder in a chamber (470); an imaging system (440) to locate an opaque defect (405) on the substrate, the imaging system including a first electron column, the first electron column to direct a first set of electrons towards the opaque defect; a gas delivery system (450) to dispense a reactant gas towards the opaque defect; and an electron delivery system (460) to induce chemical etching of the opaque defect by the reactant gas without damaging underlying layers, the electron delivery system including a second electron column, the second electron column to direct a second

set of electrons towards the opaque defect. See Figure 4. Also, see pages 12-14 of the specification.

In contrast, Casey, Jr. et al. teaches a focused ion beam (FIB) system (10) having an ion column (12) that sits above a vacuum chamber (22) with a reactant material delivery system (34) where the vacuum chamber houses a stage (24), a platform (26), a workpiece (30), a secondary particle detector (28), and a charge neutralization element (32). See Figure 1. Also, see Col. 4, lines 28-34.

The system of Casey, Jr. et al. may encompass a beam of other particles, such as electrons, as long as the particles are suitable for etching a workpiece. See Col. 3, lines 8-11. In particular, Casey, Jr. et al. clearly teaches that any such particle beam must precisely mill a workpiece having an opaque film patterned on a substrate. See Col. 4, lines 5-9. Applicants wish to bring to the attention of the Examiner that the electrons of Applicants' claimed invention do not etch or mill and, thus, are not encompassed in the system as taught by Casey, Jr. et al.

The Examiner cites Baum et al. to teach an art-accepted definition of an "electron beam column". See footnote 1 at the bottom of pages 3-4 of the Office Action mailed December 15, 2004. Then, the Examiner states that Hashimoto teaches an electron beam column as defined by Baum et al.

Applicants believe that the Examiner is mistaken since Baum et al. clearly teaches that an electron beam column must include electron optics (32, 66) so as to form an electron beam and to scan the beam. See Figure 1. Also, see Col. 6, lines 30-39.

Consequently, Applicants believe that Hashimoto fails to teach an electron beam column, and, instead, only teaches an electron gun (12) to provide a primary electron beam (16) to irradiate a thin-film specimen (15) on a specimen stage (14) heated with a power source (18) in a vacuum container (11) and an energy loss spectrum analyzer (13) to analyze electrons (17) reflected from a surface of the specimen to determine an average crystallite size of a material formed by thermal chemical vapor deposition (CVD) from a source gas container (19), a valve (20), a

flow rate controller (21), and a control means (22). See Figure 6. Also, see Col. 11, lines 58-64.

Furthermore, Applicants wish to point out to the Examiner that reflected electrons are not the same as secondary electrons. Hashimoto may teach spectroscopic analysis of reflected electrons, but Hashimoto fails to teach imaging of secondary electrons.

Thus, despite the assertions of the Examiner, a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 1 of Applicants' claimed invention. Consequently, Applicants' claimed invention, as claimed in claim 1, would not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

Claims 4-12, 18, and 20-24 are dependent on claim 1. Since a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 1 of Applicants' claimed invention, the apparatus claimed in claims 4-12, 18, and 20-24 of Applicants' claimed invention would also not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 1, 4-12, 18, and 20-24 under 35 U.S.C. §103 (a).

Claims 25-30

Applicants respectfully disagree with the Examiner. Applicants have amended claim 25. Support is provided at lines 25-27 on page 9 of the specification.

Claim 25, as amended, of Applicants' claimed invention, claims an apparatus (400) including: a chamber (470): a stage (430) located in the chamber, the stage to

move in different directions; a holder (420) positioned in the chamber by the stage; a mask (410) mounted on the holder; an opaque defect (405) located on the mask; an imaging system (440) for the chamber, the imaging system to locate the opaque defect; a gas delivery system (450) for the chamber; a gas dispensed by the gas delivery system towards the opaque defect; an electron delivery system (460) for the chamber; electrons directed by the electron delivery system towards the opaque defect, the electrons to induce the gas to etch the opaque defect without damaging underlying layers; and a pumping system to evacuate volatile byproducts of the etch. See Figure 4. Also, see pages 12-14 of the specification.

In contrast, Casey, Jr. et al. teaches a focused ion beam (FIB) system (10) having an ion column (12) that sits above a vacuum chamber (22) with a reactant material delivery system (34) where the vacuum chamber houses a stage (24), a platform (26), a workpiece (30), a secondary particle detector (28), and a charge neutralization element (32). See Figure 1. Also, see Col. 4, lines 28-34.

The system of Casey, Jr. et al. may encompass a beam of other particles, such as electrons, as long as the particles are suitable for etching a workpiece. See Col. 3, lines 8-11. In particular, Casey, Jr. et al. clearly teaches that any such particle beam must precisely mill a workpiece having an opaque film patterned on a substrate. See Col. 4, lines 5-9. Applicants wish to bring to the attention of the Examiner that the electrons of Applicants' claimed invention do not etch or mill and, thus, are not encompassed in the system as taught by Casey, Jr. et al.

The Examiner cites Baum et al. to teach an art-accepted definition of an "electron beam column". See footnote 1 at the bottom of pages 3-4 of the Office Action mailed December 15, 2004. Then, the Examiner states that Hashimoto teaches an electron beam column as defined by Baum et al.

Applicants believe that the Examiner is mistaken since Baum et al. clearly teaches that an electron beam column must include electron optics (32, 66) so as to form an electron beam and to scan the beam. See Figure 1. Also, see Col. 6, lines 30-39.

Consequently, Applicants believe that Hashimoto fails to teach an electron beam column, and, instead, only teaches an electron gun (12) to provide a primary electron beam (16) to irradiate a thin-film specimen (15) on a specimen stage (14) heated with a power source (18) in a vacuum container (11) and an energy loss spectrum analyzer (13) to analyze electrons (17) reflected from a surface of the specimen to determine an average crystallite size of a material formed by thermal chemical vapor deposition (CVD) from a source gas container (19), a valve (20), a flow rate controller (21), and a control means (22). See Figure 6. Also, see Col. 11, lines 58-64.

Furthermore, Applicants wish to point out to the Examiner that reflected electrons are not the same as secondary electrons. Hashimoto may teach spectroscopic analysis of reflected electrons, but Hashimoto fails to teach imaging of secondary electrons.

Thus, despite the assertions of the Examiner, a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 25 of Applicants' claimed invention. Consequently, Applicants' claimed invention, as claimed in claim 25, would not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

Claims 26-30 are dependent on claim 25. Since a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 25 of Applicants' claimed invention, the apparatus claimed in claims 26-30 of Applicants' claimed invention would also not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claims 25-30 under 35 U.S.C. §103 (a).

Claims 31-33

Applicants respectfully disagree with the Examiner. Applicants have amended claim 31. Support is provided at lines 25-27 on page 9 of the specification.

Claim 31, as amended, of Applicants' claimed invention, claims an apparatus (400) including: a chamber (470), the chamber to hold a mask (410): an imaging system (440) for the chamber, the imaging system to locate an opaque defect (405) on the mask; a gas delivery system (450) for the chamber, the gas delivery system to dispense one or more gases towards the opaque defect; and an electron delivery system (460) for the chamber, the electron delivery system to direct electrons towards the opaque defect, the electrons to induce chemical etching of the opaque defect by the one or more gases without damaging underlying layers. See Figure 1. Also, see Col. 4, lines 28-34.

In contrast, Casey, Jr. et al. teaches a focused ion beam (FIB) system (10) having an ion column (12) that sits above a vacuum chamber (22) with a reactant material delivery system (34) where the vacuum chamber houses a stage (24), a platform (26), a workpiece (30), a secondary particle detector (28), and a charge neutralization element (32). See Figure 1. Also, see Col. 4, lines 28-34.

The system of Casey, Jr. et al. may encompass a beam of other particles, such as electrons, as long as the particles are suitable for etching a workpiece. See Col. 3, lines 8-11. In particular, Casey, Jr. et al. clearly teaches that any such particle beam must precisely mill a workpiece having an opaque film patterned on a substrate. See Col. 4, lines 5-9. Applicants wish to bring to the attention of the Examiner that the electrons of Applicants' claimed invention do not etch or mill and, thus, are not encompassed in the system as taught by Casey, Jr. et al.

The Examiner cites Baum et al. to teach an art-accepted definition of an "electron beam column". See footnote 1 at the bottom of pages 3-4 of the Office

Action mailed December 15, 2004. Then, the Examiner states that Hashimoto teaches an electron beam column as defined by Baum et al.

Applicants believe that the Examiner is mistaken since Baum et al. clearly teaches that an electron beam column must include electron optics (32, 66) so as to form an electron beam and to scan the beam. See Figure 1. Also, see Col. 6, lines 30-39.

Consequently, Applicants believe that Hashimoto fails to teach an electron beam column, and, instead, only teaches an electron gun (12) to provide a primary electron beam (16) to irradiate a thin-film specimen (15) on a specimen stage (14) heated with a power source (18) in a vacuum container (11) and an energy loss spectrum analyzer (13) to analyze electrons (17) reflected from a surface of the specimen to determine an average crystallite size of a material formed by thermal chemical vapor deposition (CVD) from a source gas container (19), a valve (20), a flow rate controller (21), and a control means (22). See Figure 6. Also, see Col. 11, lines 58-64.

Furthermore, Applicants wish to point out to the Examiner that reflected electrons are not the same as secondary electrons. Hashimoto may teach spectroscopic analysis of reflected electrons, but Hashimoto fails to teach imaging of secondary electrons.

Thus, despite the assertions of the Examiner, a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 31 of Applicants' claimed invention. Consequently, Applicants' claimed invention, as claimed in claim 31, would not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

Claims 32-33 are dependent on claim 1. Since a combination of the apparatus of Casey, Jr. et al. with the apparatus of Hashimoto, even if possible, would still not produce the apparatus claimed in claim 1 of Applicants' claimed invention, the apparatus claimed in claims 32-33 of Applicants' claimed invention would also not

have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claim 31-33 under 35 U.S.C. §103 (a).

Claim Rejections 35 U.S.C. § 103 (a)

Claim 19

The Examiner has rejected claim 19 under 35 U.S.C. §103 (a) as being unpatentable over Casey, Jr. et al. (US 6,042,738) as demonstrated by Baum et al. (US 5,684,360) in view of Hashimoto (US 6,420,701) and Fuji et al. (US 5,876,504).

Applicants respectfully disagree with the Examiner.

Claim 19 of Applicants' claimed invention, claims an apparatus (400) including: a holder (420) to mount a substrate (410); a stage (430) to position the holder in a chamber (470); an imaging system (440) to locate an opaque defect (405) on the substrate, the imaging system including a first electron column, the first electron column to direct a first set of electrons towards the opaque defect; a gas delivery system (450) to dispense a reactant gas towards the opaque defect with an angular dispersion of 5-25 degrees; and an electron delivery system (460) to induce chemical etching of the opaque defect by the reactant gas without damaging underlying layers, the electron delivery system including a second electron column, the second electron column to direct a second set of electrons towards the opaque defect. See Figure 4. Also, see pages 12-14 of the specification.

In contrast, Casey, Jr. et al. teaches a focused ion beam (FIB) system (10) that includes an ion column (12), a vacuum chamber (22), a stage (24), a platform (26), a

workpiece (30), a reactant material delivery system (34), a secondary particle detector (28), and a charge neutralization element (32). See Figure 1. Also, see Col. 4, lines 28-34.

The system of Casey, Jr. et al. may encompass a beam of other particles, such as electrons, as long as the particles are suitable for etching a workpiece. See Col. 3, lines 8-11. In particular, Casey, Jr. et al. clearly teaches that any such particle beam must precisely mill a workpiece having an opaque film patterned on a substrate. See Col. 4, lines 5-9. Applicants wish to bring to the attention of the Examiner that the electrons of Applicants' claimed invention do not etch or mill and, thus, are not encompassed in the system as taught by Casey, Jr. et al.

The Examiner cites Baum et al. to teach an art-accepted definition of an "electron beam column". See footnote 1 at the bottom of pages 3-4 of the Office Action mailed December 15, 2004. Then, the Examiner states that Hashimoto teaches an electron beam column as defined by Baum et al.

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Consequently, Applicants believe that Hashimoto fails to teach an electron beam column, and, instead, only teaches an electron gun (12) to provide a primary electron beam (16) to irradiate a thin-film specimen (15) on a specimen stage (14) heated with a power source (18) in a vacuum container (11) and an energy loss spectrum analyzer (13) to analyze electrons (17) reflected from a surface of the specimen to determine an average crystallite size of a material formed by thermal chemical vapor deposition (CVD) from a source gas container (19), a valve (20), a flow rate controller (21), and a control means (22). See Figure 6. Also, see Col. 11, lines 58-64.

Furthermore, Applicants wish to point out to the Examiner that reflected electrons are not the same as secondary electrons. Hashimoto may teach

spectroscopic analysis of reflected electrons, but Hashimoto fails to teach imaging of secondary electrons.

Fuji et al. teaches a large-area, high-speed, uniform chemical vapor deposition (CVD) apparatus for crystallographic-oriented oxide thin films that includes a material gas supplier (8) located at a predetermined tilt angle, theta, with respect to a rotatable, heated substrate holder/electrode (4) in a high-frequency plasma electric discharge area (7) between parallel-plate electrodes (4, 5) in a low-pressure reaction chamber (1). See Figure 2. Also, see Col. 4, lines 35-37.

Despite the assertions of the Examiner, a combination of the apparatus of Casey, Jr. et al. as demonstrated by Baum et al., the apparatus of Hashimoto, and the apparatus of Fuji et al., even if possible, would still not produce the apparatus claimed in claim 19 of Applicants' claimed invention. Consequently, Applicants' claimed invention, as claimed in claim 19, would not have been obvious to one of ordinary skill in the art of semiconductors at the time the invention was made.

In view of the foregoing, Applicants respectfully request the Examiner to withdraw the rejections to claim 19 under 35 U.S.C. §103 (a).

Conclusion

Applicants believe that all claims pending are now in condition for allowance so such action is earnestly solicited at the earliest possible date.

PETITION FOR EXTENSION OF TIME
PURSUANT TO 37 C.F.R. § 1.136 (a)

Applicant respectfully petitions pursuant to 37 CFR 1.136(a) for a two-month extension of time to file this response to the Office Action mailed December 15, 2004. The extended period is set to expire on Monday, May 16, 2004. A check in the amount of $450.00 is enclosed to cover the fee for a two-month extension of time.

Pursuant to 37 C.F.R. 1.136(a)(3), Applicants hereby request and authorize the U.S. Patent and Trademark Office to treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time.

Should there be any additional charge or fee, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, please charge Deposit Account No. 02-2666.

If a telephone interview would in any way expedite the prosecution of this application, the Examiner is invited to contact the undersigned at (408) 720-8300.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Dated: May 16, 2005

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